

## Message Text

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ORIGIN EUR-25

INFO OCT-01 NEA-10 ADP-00 AID-20 CEQ-02 CIAE-00 COA-02

COME-00 DODE-00 EB-11 EPA-04 INR-10 IO-13 L-03 NSF-04

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APPROVED BY:(EUR:RPM:ACFLOYD

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EUR:NE:EFLEISHER (INFO) EUR:SPP:TMARTIN (INFO)

EUR:NE:CFLOYD (INFO) EUR:CAN:ENEF (INFO)

EUR:WE:CTMAGEE (INFO) EUR:WE:CKJOHNSON (INFO)

SCI:EN:SBLACKISTON (SUBS) EUR:JREND AHL

S/S-O:JMEALUM CEQ:MR. RIORDAN (SUBS)

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EUR:NE:JPOWENS (INFO) EUR:RPM:DAPEPPERS

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FM SECSTATE WASHDC

TO ALL NATO CAPITALS

AMEMBASSY STOCKHOLM

INFO USMISSION EC BRUSSELS

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AMEMBASSY TOKYO

UNCLAS STATE 146402

E.O. 11652: N/A

TAGS: NATO, SENV, SW

SUBJECT: CCMS: ENERGY CONSERVATION PROJECT (SWEDEN)

1. SUMMARY: US CCMS ENERGY CONSERVATION TEAM MET JULY 18  
IN STOCKHOLM WITH FOLLOWING OFFICIALS OF STATES,  
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PROVNINGSANSTALT (BUILDING MATERIALS TESTING INSTITUTE)

UNDER MINISTRY OF INDUSTRY: OVE NORELL (DIRECTOR

GENERAL), ERIK SAARE (CHIEF ENGINEER MECHANICS AND

HEAT DEPARTMENT) AND BERTIL PETTERSSON (THERMOGRAPHY

EXPERT). ALSO PRESENT WERE INGEMAR HOGLUND (PROFESSOR IN BUILDING TECHNOLOGY AT ROYAL INSTITUTE OF TECHNOLOGY) AND BENGT AXEN (DEVELOPMENT ENGINEER AT BPA-RIKSBYGGEN, ONE OF THE LARGEST CONSTRUCTION FIRMS IN SWEDEN). US TEAM WAS GIVEN BRIEFING ON INSTITUTE ORGANIZATION AND TESTING ACTIVITIES, APPLICATION OF SWEDISH BUILDING STANDARDS, THERMOGRAPHY INSTRUMENTS AND EXPERIENCE WITH THEIR USE, AND NEED FOR GREATER ENERGY CONSERVATION IN BUILDINGS IN LIGHT OF GENERAL ENERGY CONSUMPTION IN SWEDEN. SWEDISH EXPERTS CLEARLY OF HIGH CALIBER.

BOTH NORELL AND SAARE INDICATED GENERAL INTEREST IN COOPERATIVE PROJECT IN ENERGY CONSERVATION AREA AND WILLINGNESS TO CONSIDER US PROPOSALS WITH A VIEW TO SWEDISH PARTICIPATION. HOGLUND INDICATED THAT SWEDEN WAS INTERESTED IN ALL THREE AREAS OF ENERGY CONSERVATION

PROJECT: BUILDINGS, INDUSTRIAL PROCESSES AND TRANSPORTATION MODES. HOGLUND STRESSED VERY STRONGLY NEED FOR SWEDEN TO REDUCE ITS ENERGY CONSUMPTION, PARTICULARLY IN BUILDING AREA WHERE ENERGY CONSUMPTION FOR RESIDENTIAL HEATING, COOLING AND HOT WATER ACCOUNT FOR 30 PERCENT OF TOTAL ENERGY DEMAND. END SUMMARY.

2. NORELL OPENED MEETING WITH GENERAL BRIEFING ON COORDINATIVE ROLE OF BUILDING MATERIALS TESTING INSTITUTE WITH RESPECT TO OFFICIAL TESTING AND ITS RESPONSIBILITIES REGARDING THE LEGAL AND TECHNICAL ASPECTS OF STANDARDIZED MEASURES IN SWEDEN. AS PART OF NEW MANDATE, THE INSTITUTE, WHICH HAS APPROXIMATELY 350 EMPLOYEES, WILL COORDINATE ALL BUILDING MATERIALS TESTING IN SWEDEN. THERE ARE 28 DIFFERENT AUTHORITIES IN SWEDEN THAT HAVE RESPONSIBILITY FOR DESCRIBING TECHNICAL PROPERTIES AND SETTING AND ENFORCING STANDARDS WITH RESPECT TO BUILDING MATERIALS, AND INSTITUTE WILL TO LARGE EXTENT AUTHORIZE OTHER UNCLASSIFIED

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INSTITUTIONS ACTUALLY TO CONDUCT TESTING. THESE INSTITUTIONS WILL BE PAID FEES BY INDUSTRY, SUCH FEES TO INCLUDE ADDITIONAL AMOUNTS FOR INSTITUTE'S WORK TO IMPROVE TESTING METHODOLOGY.

3. LABELLING WITH RESPECT TO APPLIANCE ENERGY EFFICIENCY IS VOLUNTARY IN SWEDEN. HOWEVER, ALL MAJOR SWEDISH APPLIANCE MANUFACTURERS IN FACT LABEL THEIR PRODUCTS IN THIS RESPECT. IN CONNECTION WITH NEW (JANUARY 1973) SWEDISH CONSUMERS ORGANIZATION, NORELL STATED THAT RECENT REPORT RECOMMENDS THAT SOME (WITHOUT SPECIFYING WHICH) PRODUCT LABELLING SHOULD BE COMPULSORY. NEW CONSUMER ORGANIZATION ALSO

HAS POWER TO PRESCRIBE STANDARDS (MAINLY FOR PROTECTION OF LIFE AND HEALTH) WHICH IN BUILDING MATERIALS CASE ARE BASED ON TECHNICAL CRITERIA DEVELOPED BY INSTITUTE. SAARE POINTED OUT THAT IN SWEDEN ROUGHLY 500 NEW BUILDING PRODUCTS APPEAR ON THE MARKET EVERY YEAR, AND THAT THE INSTITUTE'S CERTIFICATION OF GENERAL CLASSES OF MATERIALS IS REQUIRED.

4. NORELL NOTED THAT 95 PERCENT OF ALL RESIDENTIAL CONSTRUCTION IN SWEDEN INVOLVES GOVERNMENT CREDIT FACILITIES. IN ORDER TO QUALIFY FOR A LOAN, THE OWNER AND/OR BUILDER HAS TO COMPLY WITH NATIONAL CONSTRUCTION STANDARDS WHICH ARE PERFORMANCE ORIENTED. IN ADDITION, THE SWEDISH BOARD FOR HOUSING (100 PROFESSIONALS) MUST

APPROVE PLANS FOR ALL NEW RESIDENTIAL CONSTRUCTION (APPROXIMATELY 100,000 UNITS/YEAR). PRESENT HOUSING MIX IN SWEDEN IS 70 PERCENT MULTI-FAMILY BUILDING/ 30 PERCENT SINGLE FAMILY DWELLINGS, BUT THE PERCENTAGE OF SINGLE FAMILY HOMES IS GROWING. CONSTRUCTION IS DIVIDED BETWEEN 7-10 LARGE FIRMS (75 PERCENT) AND MANY SCATTERED SMALL FIRMS (25 PERCENT). IN COMPARISON, BERG POINTED OUT THAT OVER HALF OF THE CONSTRUCTORS IN US WERE ONE MAN FIRMS.

5. US TEAM WAS THEN GIVEN TOUR OF INSTITUTE  
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LABORATORY AND BRIEFING ON THERMOGRAPHY WORK USING INFRA RED MEASUREMENTS OF TEMPERATURE FIELDS. AGA INFRARED SYSTEMS (AB) IN LIDINGO (US OFFICE C/O DIETRICH BAEU, 550 COUNTY AVENUE, SEACAUCUS, NEW JERSEY) HAS DEVELOPED LABORATORY VERSION THERMOVISION 680 WHICH CAN MEASURE VARIATIONS IN TEMPERATURE FIELD OF 0.2 DEGREE C AND BATTERY POWERED PORTABLE VERSION THERMOVISION 750, WHICH CAN MEASURE VARIATIONS IN TEMPERATURE FIELD OF 0.3 DEGREES C. INSTRUMENTS ARE PRICED IN DOLS 30-40,000 RANGE. USING INSTRUMENTS IN FIELD TESTING, SWEDES HAVE DISCOVERED THAT "SERIOUS CONSTRUCTION DEFECTS ARE FAIRLY COMMON IN NEWLY CONSTRUCTED RESIDENTIAL BUILDINGS. DEFECTS IN INSULATION AND RESULTING HOT AIR LEAKAGES ACCOUNT FOR 85 PERCENT OF DEFECTS." IN 100 HOUSES TESTED WHICH SHOWED SERIOUS DEFECTS, REMOVAL OF BUILDING OUTER SKIN SHOWED 100 PERCENT ACCURACY OF THERMOVISION MACHINE. MEVERTHELESS, SWEDES INDICATED THAT THREE MONTH TRAINING WAS NECESSARY FOR INDIVIDUALS TO INTERPRET ACCURATELY THERMOGRAPH.

6. PETTERSSON STATED THAT THERMOGRAPHY HAS THREE

IMPORTANT ADVANTAGES:

A. INSTANTANEOUS MEASUREMENT OVER LARGE SURFACES.

B. MEASUREMENT WITHOUT INTERFERENCE RESULTING FROM CONTACT BETWEEN THE OBJECT AND THE MEASURING INSTRUMENT.

C. MEASUREMENT CAN BE CARRIED OUT AT RELATIVELY LONG DISTANCE FROM THE OBJECT, PERMITTING EXAMINATION OF OBJECTS (E.G. ROOF AREAS) WHICH ARE DIFFICULT TO APPROACH AT CLOSE HAND.

PROBLEMS REPORTED INCLUDE:

A. RELIABILITY OF ESTIMATES BASED SOLELY ON SURFACE TEMPERATURE DEVIATIONS.  
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B. QUESTION AS TO WHETHER SURFACE PROPERTIES (E.G. EMISSIVITY AND POSSIBLE PERMEABILITY OF INFRARED RADIATION) AFFECT CORRECT REPRODUCTION OF ACTUAL SURFACE TEMPERATURE.

7. INSTITUTE IS CURRENTLY WORKING OUT GUIDELINES FOR INTERPRETATION OF THERMOGRAMS IN CONJUNCTION WITH SWEDISH BUILDING INDUSTRY. THE AIM OF THIS WORK IS TO SYSTEMATIZE DATA WITH RESPECT TO THE EFFECT OF EXTERNAL FACTORS (I.E. EXTERNAL FACTORS AFFECTING SURFACE TEMPERATURES OF BUILDINGS) ON THERMOGRAPHY. PRELIMINARY RESULTS SHOW THAT THERMOGRAPHY SHOULD BE USED FOR PLOTTING BUILDING FAULTS ON EXTERNAL WALLS AND QUALITATIVE ASSESSMENTS OF THE NATURE OF SUCH FAULTS. THERMOGRAPHY DOES NOT PERMIT QUANTITATIVE DETERMINATION OF WALL HEAT RESISTANCE. THERMOGRAPHY IS LIMITED TO PERIODS WHEN TEMPERATURE GRADIENTS CAN BE DETECTED THROUGH A WALL, E.D., WINTER FOR HEATED BUILDINGS; SUMMER FOR REFRIGERATED BUILDINGS. FURTHER, THERMOGRAPHY WITH ACCEPTABLE ACCURACY CANNOT BE CARRIED OUT DURING RAPIDLY CHANGING CLIMATIC CONDITIONS.

8. HOGGLUND OF ROYAL INSTITUTE OF TECHNOLOGY GAVE TEAM OVERVIEW FROM HIS PERSPECTIVE OF EFFECTS OF BUILDING HEATING AND COOLING ON SWEDISH ENERGY DEMAND. HE NOTED THAT SWEDEN WILL SHORTLY EXHAUST ITS HYDRO-ELECTRIC SOURCE POWER, AND IS DEVELOPING NUCLEAR GENERATED ELECTRICITY CAPABILITY AS QUICKLY AS POSSIBLE. IN SWEDEN, 3 PERCENT OF THE ENERGY CONSUMED BY THE ENTIRE COUNTRY IS USED FOR BUILDING HEATING AND COOLING (INCLUDING HOT WATER). THIS

AMOUNTS TO ELECTRICITY GENERATION OF 2,500 M.W.  
AVERAGE HEATING TEMPERATURES FOR BUILDINGS IN SWEDEN  
IS 23 DEGREES C IN AVERAGE HOUSE SIZE OF 100 SQUARE  
METERS, RESULTING IN NON-ELECTRICALLY HEATED HOUSES  
IN CONSUMPTION OF 3.5 CUBIC METERS OF OIL PER DWELLING  
PER YEAR. HOGLUND STATED THAT HE THOUGHT THAT SWEDEN  
WITH A POPULATION OF 8 MILLION PEOPLE CONSUMED MORE  
ENERGY THAN IN THE ENTIRE CONTINENT OF AFRICA.  
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9. HOGLUND ALSO NOTED THAT THE SWEDISH ELECTRICITY  
CONSUMPTION WAS ROUGHLY THE SAME AS IN THE US: 8,000  
KWH/PERSON/YEAR. (HE THOUGHT THAT CANADA HAD THE  
HIGHEST ELECTRICITY CONSUMPTION PER PERSON,  
FOLLOWED CLOSELY BY NORWAY.) SWEDISH ENERGY SOURCES  
ARE EXPECTED IN 1975 TO BE AS FOLLOWS: 59 PERCENT  
HYDRO, 26 PERCENT OIL, AND 15 PERCENT NUCLEAR. WHILE  
SWEDEN HAS NO NATURAL GAS SOURCE OF ITS OWN, IT IS  
CURRENTLY CONSIDERING IMPORTATION OF NATURAL GAS  
EITHER FROM NORWAY (NORTH SEA) OR USSR (THROUGH  
FINLAND). DESPITE LARGE CONSUMPTION OF ELECTRICITY  
IN SWEDEN, BUILDING HEATING BY ELECTRICITY AMOUNTS TO  
ONLY 5-10 PERCENT OF TOTAL; MOST BUILDING HEATING  
IS OIL GENERATED.

10. HOGLUND MADE STRONG STATEMENT THAT SWEDEN MUST  
REDUCE ENERGY CONSUMPTION PER CAPITA AND LOWER THE  
HIGHER THERMAL RESISTANCE OF PRESENT HEATING SYSTEMS.  
HE SUGGESTED IN THIS RESPECT USE OF THREE PANE  
WINDOWS AND ENFORCING A MAXIMUM TEMPERATURE IN  
RESIDENTIAL BUILDINGS OF 20 DEGREES C (68 DEGREES F).  
HOGLUND WAS, HOWEVER, SOMEWHAT FUZZY ABOUT POLITICAL  
ACCEPTABILITY OF SUCH A MEASURE. BERG POINTED OUT  
THAT HE HAD SUGGESTED A DESIGN TEMPERATURE IN THE  
US OF 20 DEGREES C. (THE REAL NEED IN THIS CONNECTION  
WAS TO CONTROL HUMIDITY AND DISTRIBUTE HEAT PROPERLY.)  
IN ADDITION, HOGLUND THOUGHT SWEDEN SHOULD TRY TO  
REDUCE ENERGY LOSS RESULTING FROM VENTILATION TO  
17-18 PERCENT.

11. HOGLUND POINTED OUT THAT IN SMALL HOUSES (SOME  
WITH FIRE PLACES) THE RATE OF AIR CHANGES/HOUR WAS  
0.5-0.7. ONLY 0.1-0.2 OF THESE AIR CHANGES/HOUR  
RESULTED FROM WALL LEAKAGES; THE REMAINING AIR  
CHANGES WERE DUE TO BAD WORKMANSHIP IN THE  
INSTALLATION OF INSULATION, WINDOWS, ETC. BERG NOTED  
THAT US STUDIES INDICATED THAT AN ADDITIONAL CAPITAL  
EXPENDITURE OF 10 PERCENT IN NEW CONSTRUCTION WOULD  
PROBABLY RESULT IN ENERGY COST SAVINGS SUFFICIENT  
TO JUSTIFY THE ADDITIONAL CAPITAL EXPENSE.  
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12. HOGLUND POINTED OUT THAT SWEDEN HAD DIFFICULTIES WITH RETROFITTING OLDER HOMES IN WAYS THAT WOULD RESULT IN ENERGY CONSERVATION- BUILDING INNER SHELLS IN EXISTING ROOMS WAS NOT COST EFFECTIVE, AND USE OF ADDITIONAL FOAM INSULATION CAUSED PROBLEMS WITH RESPECT TO MOISTURE COLLECTION.

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13. HOGLUND POINTED OUT THAT ROYAL INSTITUTE WAS IN PROCESS OF COMPUTER STUDY WITH RESPECT TO DESIGN

TEMPERATURE AND HEATING AND COOLING LOADS. ROYAL INSTITUTE IS PRESENTLY USING 5 TEST HOUSES TO MEASURE HEAT OVERFLOW, ENERGY CONSERVATION AND HEAT LOSSES AND GAINS THROUGH SCIENTIFIC USE OF WINDOWS. (A PREVIOUS SWEDISH PROGRAM HAD TESTED 7,000 HOUSES WITH RESPECT TO ENERGY CONSERVATION.)

14. HOGLUND ALSO INDICATED AN INTEREST IN THE USE OF SOLAR COLLECTOR AND ACCUMULATION SYSTEMS, AND ASKED US TEAM WHAT EXPERIMENTS WERE BEING CONDUCTED IN THIS RESPECT IN US. BERG MENTIONED HOUSES DEVELOPED BY UNIVERSITIES OF PENNSYLVANIA AND DELAWARE, AUDUBON SOCIETY OF MASSACHUSETTS, AND UNIVERSITY OF FLORIDA. AT END OF MEETING, HOGLUND STATED THAT, FROM HIS POINT OF VIEW, SWEDEN WAS INTERESTED IN ALL THREE AREAS OF ENERGY CONSERVATION.

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